BIO-DYNAMICS

A periodical furthering soil conservation and increased fertility in order to improve nutrition and health.

SUMMER 1950

PAGE

THE BIO-DYNAMIC METHOD IN 1950 2

BIO-DYNAMIC SPRAY 501 ..... *Evelyn Speiden* 10

TEXAS LOOKS AT B.D. COMPOST 13

BOOK REVIEWS ..... *Ehrenfried E. Pfeiffer* 16

EXPERIENCES WITH A FARM POND ..... *George Bechtold* 21

BOGS, BOTTOM LAND AND "BANKING" IN SOUTHERN NEW JERSEY ..... *Claude N. Terry* 24

SOIL AND HEALTH ..... *Walter Vander Beek* 27

VOL. VIII NO. 3

Published and Copyright (1950) *by the*
BIO-DYNAMIC FARMING AND GARDENING ASSOCIATION, INC.
R. D. 1, CHESTER, NEW YORK

"Bio-Dynamics" Trade Mark Registered

Price 25c a copy; $1.00 a year

THE BIO-DYNAMIC METHOD IN 1950

The bio-dynamic method of soil improvement has now been in use for over 25 years. Practical experience, scientific research and field tests as well as laboratory tests have proved its value. The following practices and points of view have been developed during this period, leading to the fullest use of the method:

1. *Manure Treatment*:

Manures of all kinds ferment and break down gradually into humus. If carelessly handled, or scattered about, they lose valuable nitrogen (ammonia and nitrite nitrogen are formed, finally the nitrogen escapes); potassium is washed out by the rain and the running off of moisture. A high content of strawy and cellulose materials take away from the oxidation and biological "digestive" power in the soil; the humus formation in soil is slowed down. Losses of nitrogen can amount to 50% or more. Losses of potassium and other minerals can be 20% or higher. Cases where everything has been washed out have been observed. Orthodox agriculture, therefore, recommends spreading and plowing under fresh manure at once. If the soil conditions are not adequate—too acid, too alkaline, lacking absorbent colloidal structure so that the soil cannot "hold" the compounds which are set free from the manure, losses still continue even when the manure is plowed under fresh. If it is left on top of the land it will "weather" away too, nitrogen in particular will be lost. Then too, it is not always possible to plow the manure under immediately, for instance when the soil is frozen, too wet, or too dry. Spreading and plowing under, therefore, cannot always be done at once and there are times when the manure must be set up in piles.

Bio-dynamic manure is set up in piles and treated as it leaves the barn. Storage piles are set up in a suitable place, either in a manure yard or on the edges of the fields where the manure will be used. These heaps are set up on bare ground, if possible, and covered with a thin layer of earth, straw, or leaves, to protect them from the sun and weather. They are treated with the bio-dynamic preparations 502 to 507 to direct the fermentation towards humus and to avoid losses of nitrogen etc. Nitrogen fixing bacteria set to work and the nitrogen content of the manure will increase. In practice, increases of up to 100% can be obtained. In the most ideal cases increases of 400% were observed.

The proper treatment of manure is described in the leaflet MANURES, reprinted from *Bio-Dynamics*. Composted manure is far superior to untreated manure in every respect. An application of 10 tons/acre to manured crops in the rotation on farms is recommended. Manure should be applied at least once in three to five years on the farm and once in succession to each third or fourth garden crop. For intensive truck gardening an application of 12 to 15 tons/acre may be needed every other year.

2. *Compost Treatment*:

Organic wastes of all kinds can be transformed into humus. There are many different, more or less efficient methods of composting. First of all,

every organic substance (waste) can be used for compost. However, if we leave the process to chance, much nitrogen is lost and decomposition may take a long time, from 6 months to 4 years, as with the old-fashioned way of making leafmold piles. The bio-dynamic method, therefore, advocates setting compost piles up in thin layers, mixed with earth and lime, and treating them with the bio-dynamic preparations 502-507. There piles break down in from 3 to 12 months, depending on the climate, moisture conditions and the materials used. The exact procedure is described in the leaflet *THE COMPOST HEAP.*

The quantities of organic material which can be collected on a farm, in a garden, in a park, from household, restaurant, city garbage and industrial wastes, are simply remarkable. Chaff, straw, leaves, vegetable refuse, grass cuttings, hedge clippings, cut flowers, weeds, old hay, wild hay, cornstalks, garbage, pond cleanings, road and ditch scrapings, slaughter house refuse, restaurant, fruit, vegetable and fish market wastes, hoof and horn meal, wool wastes, tobacco dust, sawdust, cotton waste, peanut shells, citrus waste,—all these can be used for composting.

Experience has shown that on a 200-acre farm, which produces about 150 to 200 tons of manure annually, 50 to 120 tons of other wastes can be collected for compost. Even from a small flower or vegetable garden a few cubic yards of wastes can be collected. The garbage of towns and cities is collected at great expense nowadays. If it is not used for hog feeding it is usually incinerated. Composting city garbage would open up a rich source of humus. A medium sized town with 50,000 inhabitants produces about 100 tons of garbage daily; small towns of 4 to 6,000 population collect around 100 tons a week. In New York, Chicago, and Philadelphia about 1½ lbs. of household garbage per capita are produced every day. The town with a population of 50,000 could produce enough compost to fertilize 7 to 10,000 acres of land. Greater New York could fertilize 230,000 acres of land. It is important to transform all these wastes into humus to arrest the decline of the organic matter content of soils. Where such wastes are available in large amounts and speed of fermentation is essential in order to avoid obnoxious odors and to provide for a quick turnover, machine composting processes have been developed recently. Grinding machines have been devised and are in production. Dr. E. Pfeiffer has worked out, in connection with the bio-dynamic method in general, a special B.D. Compost Starter for machine composting which turns all kinds of organic wastes into compost in from 8 to 20 days. Such machines are already available for use in small gardens as well as for large scale garbage disposal in quantities up to 20 tons per day. Another machine is in process of development which will handle up to 100 tons daily. Literature: *Municipal and Industrial Composting, Bio-Dynamics, Spring* 1950. *Fast Machine Composting, Bio-Dynamics, Winter* 1949.

3. *The Proper Crop Rotation:*

Proper crop rotation is essential in order to preserve the fertility of the soil. The general rule is that soil-exhausting crops such as corn, potatoes

and mangels, in the fields, and cabbage, cauliflower, etc., in the garden, alternate with soil-restoring crops of the legume family—peas, beans, clover, alfalfa, etc. Furthermore, deep rooting crops should alternate with shallow rooting ones, crops requiring manure with those which do not need it. A carefully thought out crop rotation is the opposite of monoculture which in the long run completely exhausts the soil. The crop rotation plan should be made in accordance with soil, climatic and market conditions and must, therefore, be worked out individually for each case, whether farm, flower, or vegetable garden.

4. *The Proper Soil Treatment*:

Proper working of the soil consists mainly of knowing the right time and right depth of plowing, of harrowing, disking, cultipacking, rolling, etc. Much skill and experience are needed. A cultipacker applied at the right moment, at the beginning of a dry period, can preserve the moisture for a long time. Deep plowing of a too wet soil can ruin a field for many years. Only thoughtful experience combined with investigation, such as the taking of soil profiles, makes possible maximum efficiency in soil treatment.

Protective measures and mixed cultures require individual study of each case. The book, *Bio-Dynamic Farming and Gardening* by Dr. E. Pfeiffer, is of inestimable value in working out these problems.

The average organic matter content of American soils is now 1.5%. Good soils have from 2 to 5%; a critical point is reached below 1.5% and below 1% the fertility of a soil is really in danger. Bio-Dynamic farms have obtained and held a high level of organic matter, from 2 to 5%, over many years. Another beneficial effect of the method, noted in acid soils, has been the increases of the pH from 5.5 to 6.5 within a few years, while still in process of conversion.

5. *How to Begin with the Bio-Dynamic Method*:

A farm can be converted to the bio-dynamic method at once within the limits of the available manure and compost. A crop rotation plan is worked out. With a 5-year rotation, manure would go to the same field every fifth year, at the average rate of 10 tons/acre. If compost is available, top dressing of grass, clover, and pastures is recommended at the rate of 5 to 8 tons/acre in the 3rd year of the rotation. It is the aim of the bio-dynamic farmer to produce as much manure and compost as possible. Soil conservation practices, contour plowing, strip cropping, the establishment of good drainage, subsoiling, inter- and after crops, and green manuring are routine procedures on bio-dynamic farms. The bio-dynamic association will assist in working out crop rotation plans. Farm surveys, crop rotations and feeding plans, soil tests, etc. can be made at nominal fees, to be agreed upon according to the extent of the project in question.

Gardens can be converted at once if sufficient manure and compost are available. Crop rotation is also essential in a garden. Our general rule is on good soils, to follow a soil-exhausting crop, to which manure has been given, with a "neutral" crop, then with a legume (plus compost); while on poor land the soil-exhausting crop is followed with a legume and then with

a "neutral" crop. Corn, potatoes, cotton, sugar beets, onions, and cabbage are soil-exhausting crops. Where there is not enough manure available, compost from any and every source should be collected. The new machine-bacteria composting process will be of great help in such areas to draw on organic resources otherwise lost and wasted.

The aim of the bio-dynamic farmer is to be as nearly self-sufficient as possible. His crop rotation is adjusted so that he can produce all bulk livestock feed (pasture, hay and silage) and as much grain feed as is possible on the farm. It may be necessary to feed concentrates in addition for high dairy production during the conversion phase, but it has been observed that cows on improved bio-dynamic pastures will not even touch the grain in the manger. Only experience can show how much extra feed is needed besides the home grown supply. The beneficial effects of bio-dynamically grown feed can be observed within a few years in the health and increased production of the animals.

Insect pests play a minor role on well-established bio-dynamic farms; usually, according to our observations, they are not apt to spread out. We avoid metallic poison sprays, such as copper, lead and arsenic compounds which may remain in the soil and disturb the microflora. Organic poisons, such as derris, rotenone, nicotine, and pyrethrum are permitted. Many bio-dynamic farms and gardens after the conversion phase are also able to do without these.

Lime or phosphate can be used in the first stages or sparingly thereafter, whenever the need appears. When the manure is properly treated and good crop rotations followed no nitrogen fertilizer is needed on bio-dynamic farms. The fertilizer bill has been considerably reduced on most bio-dynamic farms. Soil and plant tissue tests have shown that no deficiency symptoms have resulted.

Bio-dynamic farms and gardens rank very high. The gradual improvement of the soil increases resistance to drought as well as to diseases.

6. *The Bio-Dynamic Preparations*:

The bio-dynamic preparations are made of certain medicinal herbs, which together with animal organs have undergone a long process of fermentation to enrich them in growth-stimulating substances (growth hormones). They act as yeast in dough, that is they speed and direct fermentation toward the desired neutral colloidal humus. A manure heap treated with the preparations usually contains 10 times more bacteria than the same manure untreated.

Soil given properly prepared manure or compost transmits sturdy, health-giving qualities to all crops, with beneficent results for men and animals. This is an achievement that is unanimously recognized by those who use these methods and that manifests itself very quickly.

For practical reasons the preparations are numbered 500 to 508. Numbers 502 to 507 are applied to the manure and compost. The heaps are inoculated with small quantities of these. They have no manuring effect, their

purpose being to direct the fermentation of all kinds of organic matter towards humus.

The preparations 500 and 501 and 508 are sprayed, diluted in water, directly on the land and on the plants. Number 500 stimulates the humus formation in the soil, and the growth of fine hair roots. Number 501 stimulates the assimilation of carbon dioxide by the green leaf and the growth of the entire plant. Number 500 is applied mainly in the fall and spring before clearing or after plowing and sowing; number 501 in May and June on the green leaves. Spray 508 is used against fungus diseases and to counteract the effects of too much wet weather. There is no secret about the preparations. The originator desired that they be made available to every farmer and gardener everywhere and that they not be commercialized. For this reason the formulas are not published. The Bio-Dynamic Farming and Gardening Associations in different countries act as trustees in accordance with the wishes of the inventor. To farmers or gardeners who are members of the American Association which has its headquarters at R. D. 1, Chester, N. Y., the preparations are given at cost price.

One set of preparations 502 to 507 is sufficient to treat a compost or manure pile 21 feet in length, with each of the 6 preparations put in a separate hole, the holes 3 feet apart. The pile should not be less than 6 feet wide at the base. A pile half the length mentioned above and twice the width takes the same amount of preparations. For smaller piles, one still must use a full set; for a larger pile 2 or more sets are needed. Preparations 500 and 502 and 507 should not be allowed to dry out. If they cannot be used soon after arrival, remove from bags, put each preparation in a glass jar or small crock, cover loosely. Bury these in *moist* earth. Keep the earth moist. Do not wet the preparations themselves. *Do not send for them until you are nearly ready to use them.* Preparations 502 to 507 are the only ones needed at first. The 500, 501 and 508 are not used *until one already has spread the treated and ripened manure or compost on the land.* Only then are these sprays fully effective. For prices of the preparations, see separate sheet.

7. *Size of Bio-Dynamic Farms and Gardens*:

There are really no limits to the size as far as application of the method is concerned. While the small farmer and gardener has the advantage of being able to control his land easily, there is no reason why the farmer with extensive acreage cannot manage his land according to bio-dynamic principles. Small holders' gardens of 30 x 30 feet as well as large estates of several thousand acres have successfully used these methods. A special detailed plan has been worked out for small gardens making it possible to produce about 400 to 500 pounds of vegetables yearly on a 30 x 30 foot lot. For larger holdings individual plans are more satisfactory.

In general, it is simply a question of management and organization. The time and labor spent on the handling of manure or compost is amply repaid by the gains in nitrogen, the avoidance of losses in potassium, phosphates and minor (trace) minerals, the improved feeding value of crops, and particularly in the improved crumbly structure of the soil which facili-

tates tillage. The proper application of the bio-dynamic method involves about 2 to 2.5% of the entire farm operation in costs and labor. The returns from this are manifold. If anyone can run a farm or garden successfully with antiquated methods of farming or gardening, he will have no difficulty in making a success of the bio-dynamic method. Skillful management is the answer.

8. *The Health Value of Bio-Dynamic Products*:

Analysis and feeding tests have shown that bio-dynamically grown products have an exceptionally high content of vitamins and minerals including trace minerals, a high protein content, and keep well. Data on these findings are published from time to time in Bio-Dynamics, issued quarterly by the association. The bio-dynamic trademark has been established for such products which are grown strictly in accord with the bio-dynamic method and under the control of the Bio-Dynamic Farming and Gardening Association.

9. *The Biochemical Research Laboratory*:

The research laboratory, located at the Threefold Farm, Spring Valley, N. Y., under the direction of Dr. E. Pfeiffer, is financed by gifts and bequests to the Bio-Dynamic Farming and Gardening Association. It maintains a soil, manure and compost testing service and carries on research in soils, humus, composting methods and fermentation, quality control of crops, feeding tests, comparing bio-dynamically raised crops with others, and field tests. Recently new procedures in composting organic wastes and city garbage have been worked out in the laboratory. Surveys of all organic methods are made and their respective values established. Many improvements in the bio-dynamic method have been worked out there.

10. *History and Organization*:

The fundamental principles of bio-dynamic farming and gardening were established by the late Dr. Rudolf Steiner, an Austrian philosopher and scientist, who spent all his life in research and investigation of the forces that regulate life and growth. The preparatory period covered the years 1922 to 1930. Since then the application of bio-dynamic methods has spread rapidly on the European continent, in England and America, New Zealand, North Africa and Australia. At present there are more than 2,000 farmers and gardeners using these methods.

The Bio-Dynamic Farming and Gardening Association is a non-profit organization established to propagate the bio-dynamic methods in the United States. The Association gives advice as to soil improvement, farm and garden management, compost and manure treatment. The Association also follows all recent experiences in this field and makes them available to its members. A quarterly magazine, *Bio-Dynamics*, is especially devoted to this purpose.

Anyone who wishes to benefit from the collaboration of the Association should first make a careful study of the literature. If he then becomes convinced that these methods should be applied on his property, his first step is *actually* to start proper handling and treatment of manure and compost, as described in the literature. The Association will help with advice in individ-

ual cases upon request. It is simply a waste of time and money to start out of curiosity without the intention of carrying things through. Besides, if the methods are incorrectly applied, the unsatisfactory results will be ascribed to the methods rather than to carelessness or lack of understanding.

Information centers and demonstration farms and gardens will gradually be developed in various parts of the U. S. A.

The headquarters of the Bio-Dynamic Farming and Gardening Association, Inc., are located at R. D. 1, Chester, N. Y. Please address all inquiries to the secretary, Miss Evelyn Speiden. Phone: Chester 3F12. The information center for Canada is with Mr. R. C. Schon, St. Augustin, Two Mts. Co., Quebec, Canada, who makes preparations for Canadian use. There is also a West Coast Branch about which information will be given on request.

BIO-DYNAMIC LITERATURE

Books

Bio-Dynamic Farming and Gardening by Ehrenfried Pfeiffer. Anthroposophic Press. Paper covers $1.87. Cloth covers $2.65. Essential for anyone who wishes seriously to study and apply these methods.

Grow A Garden And Be Self-Sufficient, by E. Pfeiffer and E. Riese. Anthroposophic Press. $1.48 (out of print). Contains the special plan for a 30 x 30 foot garden and full details for the cultivation of the small, intensive vegetable garden.

(All books available at the Anthroposophic Press, 211 Madison Ave., New York 16, N. Y.)

The Earth's Face and Human Destiny by Ehrenfried Pfeiffer. The Rodale Press, Emmanus, Pa. $2.75. A vivid picture of what man has done to nature and what he can do to help repair the damage.

Other Literature

Bio-Dynamics, a quarterly magazine published by the Association, for the furtherance of soil conservation and fertility in relation to nutrition and health. 25 cents per copy, $1 per year.

The Compost Heap, reprinted from *Bio-Dynamics* ..... 20 cents

Manure, reprinted from *Bio-Dynamics* ..... 15 cents

The Treatment of Fruit Trees, Berries and Shrubs, reprinted from *Bio-Dynamics* ..... 15 cents

The Bio-Dynamic Sprays, reprinted from *Bio-Dynamics* ..... 15 cents

Does Bread Nourish? by E. Pfeiffer, reprinted from *Bio-Dynamics* 15 cents

Order all books from the publisher or through book shops. The Bio-Dynamic Association only fills subscriptions for the quarterly and orders for the pamphlets.

PRICE LISTS

Bio-Dynamic Preparations

The Bio-Dynamic preparations 502 to 507 for compost or manure heaps, and the sprays 500, 501 and 508 are described in our literature and directions are given for their use. They are not commercial products as it was the wish of their originator, Dr. Rudolf Steiner, that they be available for all. Therefore, they are made for personal use by those with long experience in Bio-Dynamic practice and an extra supply is always on hand for sale at cost to those who are willing to take the necessary care in their use. The following list gives the new rates. Since we now sell to those who are not members of the Association, the price to them, must be slightly higher in lieu of membership dues, which help to cover overhead. Postage and packing charges are included in the prices.

	To Members	*To Non-Members*
502-7 per set	$2.50	$2.75
	(enough for 15 tons of compost or manure)	
500 per portion	.65	.75 (a spray)
501 per portion	.50	.60 (a spray)
508 per portion	.30	.35 (a spray)

(Orders for over 7 sets or portions, 10% discount.)

Place orders for Bio-Dynamic preparations with the Association Secretary, R. D. 1, Chester, N. Y.

B.D. Compost Starter

2 lb. Unit enough for 1 ton of compost	$ 2.00
6 lb. Unit enough for 3 tons of compost	5.25
10 lb. Unit enough for 5 tons of compost	8.00
20 lb. Unit enough for 10 tons of compost	14.50

(Prices include packing and postage.)

Please address all correspondence regarding the B. D. COMPOST STARTER to the Biochemical Research Laboratory, Threefold Farm, Spring Valley, N. Y.

BIO-DYNAMIC AGRICULTURAL CONFERENCE

The 1950 meeting of the Bio-Dynamic Farming and Gardening Association, Inc., will be held at the Threefold Farm, Spring Valley, N. Y., from July 28th through August 1st.

While many of our readers will already have been informed of this meeting, others interested in attending the sessions can write for reservations to Mrs. Richard Kroth at the above address. More than 100 persons attended last year's gathering and appeared to enjoy the program very much. This Summer there are plans for motion pictures in addition to lectures, round table discussions, demonstrations and field trips.

BIO-DYNAMIC SPRAY 501

EVELYN SPEIDEN

Trace elements are still new and exciting in the field of scientific investigation and are becoming increasingly recognized as of great importance to life. Spray 501 functions in this field in a highly diluted solution sprayed on plant foliage. It is neither a poison nor a fertilizer in the ordinary sense, but a dynamic growth stimulant. It exercises a balancing, controlling effect on both horizontal and vertical growth and particularly on the assimilation process in the green parts of the plant. This process is undoubtedly one of the most important which takes place on the face of the earth. Only green plants can transform light energy into chemical energy and upon this depends animal and human life. From the sun's light and warmth the plants are able to synthesize food for the higher kingdoms. Helping through 501 with this process is a delicate and fascinating field of operation, yet of the three Bio-Dynamic spray preparations, 501 is probably the least understood and used. Made from powdered silica or quartz crystals, activated by exposure under special conditions to natural weathering processes during warm weather, it is the one preparation which, if dry, will keep indefinitely in good condition.

The Bio-Dynamic farmer or gardener functions in harmony with the constantly varying conditions of life rather than mechanically and according to any arbitrary rule, and will gradually learn by experience to get the maximum effect from 501 by applying it at exactly the right moment in plant development. Nevertheless, there are a few definite principles to be kept in mind in connection with its use. The first unvarying rule is—*never should* 501 *be used except following* 500. Root growth must be adequate before top growth can safely be stimulated. Observers of plant life will recognize three general stages of development—(1.) seed germination and root growth, (2.) expanding of stems and leaves, (3.) blossoming and fruit ripening. The 500 is especially concerned with the first and 501 with the second stage. During the third stage the plant should be left in peace; help not given earlier is too late now.

Naturally the time of year for 501 is late Spring and early Summer with the coming of warm days and frost-free nights. The 500 has been used earlier and is often used again in fall—but not the 501. Most plants are then in the third stage of growth and should be let alone. Besides, why encourage new growth which will only be nipped by frost? The second rule is—*never use* 501 *when there is danger of frost.*

With seedlings the ideal time for 501 is when the third or fourth pair of leaves unfolds, provided the plants are already established in permanent locations. If roots are to be disturbed by transplanting, of course the stimulation of top growth should be delayed until after the plants are well settled again. This applies to older plants, trees and shrubs as well as seedlings. Thus the third rule is—*Never use* 501 *before transplanting.* A feeling for the comfort of the plant and watchfulness of its growth changes will indicate com-

mon sense activities to follow as one learns what these Bio-Dynamic sprays will do.

Annual plants will usually need only one application of 501. Some longer-lived plants may have to be treated differently. For example, *fruit trees prior to bearing age should not receive* 501, *likewise young evergreens.* It seems to have a tendency to stimulate the fruiting process and such a forcing of young trees is quite likely to be harmful. A European forester told a story of killing a whole planting of young evergreens by spraying them with 501. Trees of bearing age which have blossoms before leaves, are sprayed only after blossoming. The same holds true of early-flowering shrubs—no sprays while blossoms are out, 501 on green leaves only.

In a small garden one naturally cannot spray each kind of plant separately, but must select the time in May or June when most of the vegetation appears to be ready, possibly with a second application two or more weeks later, especially if the season is rainy.

In wet seasons 501 is especially valuable. We know how plants are inclined to shoot into tall, weak growth with too little sun and too much rain. Application of 501 seems to enable the leaves to make better use of whatever light they have. At any rate the experience of many users has shown that it restrains the rank growth in too rainy weather just as at other times it speeds up stunted or too slow growth,—a kind of balancing effect.

Beans of all sorts seem to respond particularly well to 501, if it is used when their third leaves are out. An acceleration of growth then gets them quickly beyond the stage where various insect pests have a special liking for the plant. Probably all warmth-loving plants are notably good subjects for 501. More experience and observations are needed along this line and reports would be appreciated from anyone who uses 501.

Alfalfa and hay fields benefit by an application of 501 given soon after Spring growth starts and again after a cutting, provided root growth is well established and there is enough moisture in the soil, not in a drought.

In the realm of trace elements, Dr. Pfeiffer has found by many experiments that boron and 501 have very similar effects on plant life. Boron has been studied generally more than 501. Boron in a 3% solution kills plants; in a .3% solution is injurious; gradually becomes less injurious as the dilution is increased up to .0006%. From here to .00006% the best effect is evident. This is what is called a dynamic—rather than a chemical—effect. Boron deficiency in plants (often brought on by over-liming) causes corky core in apples; root rot in beets, carrots, turnips; cracked stem in celery; yellow heads of lettuce; stunted and yellow alfalfa; rotting before maturity, as in cabbage heads; leaves that tend to be first light green and then turn brown. Too much boron is as harmful as too little and liming also aggravates the toxic effects of an excess of it. The right proportion of boron enables a plant to open and close its cells according to necessity and thus to control the evaporation of water. Without sufficient boron, cells cannot be closed and evaporation continues until the plant dies. For field use 2 or 3 lbs. of boron per acre is enough.

The 501 is very similar but stronger than boron in its effect, so must be used only in very dilute solution. Hence a portion of 501—used in 3 gallons of water for 1 acre—is about the size of a pea, ½ to 1 gram of powder. Like 500 it must be stirred for an hour (no more, no less) to be fully activated, and then sprayed out immediately. It is particularly important with 501 —more so than with 500—to apply in a fine mist spray. Of course the sprayer must be absolutely clean with *no* residues from other sprays. It is evident that even a very small amount of extraneous material would ruin the effect of so dilute a solution as 501.

To make the solution of 501, use lukewarm water, preferably rain water in a clean container of wood or earthenware if possible, otherwise an ordinary bucket, but one large enough to prevent splashing over. Stir vigorously, first in one direction until a crater is formed in the liquid, then change quickly to the opposite direction so that the 501 is subjected to as much aeration as possible. This regular and rhythmic reversal of the direction of stirring is easier if one can pass the stirring stick from one hand to the other with each change. For small gardens this hand stirring is no problem, but for quantity production on large acreages, it is necessary to resort to the use of some such machines as described and illustrated in the article on 500 in Bio-Dynamics for Spring 1950.

The sooner 501 is sprayed out after stirring the more effective it will be, since it deteriorates rapidly on standing. This should be as early in the day as possible, certainly in the forenoon, so that foliage can have the benefit of several hours of light before dew may settle on it. Windless, bright weather, with no prospect of rain is the ideal.

In the greenhouse or indoor garden, 501 has value in helping to overcome the effects of toned-down light from which plants usually suffer, and this is true particularly during the short days of the year. Following Fall application of 500, one may spray 501 about every fifth week until Spring. During each intervening four weeks, alternate application of sprays 508 and 507, one each week, have proved beneficial. Select a certain day each week as "Spray Day" and use each week one spray in the following order—

500, 508, 501, 507, 508, 507, 508,

and repeat 501, 507, 508, 507, 508, and so on until outdoor work begins in spring. The uses of 508 and 507 will be discussed in a later article.

TEXAS LOOKS AT B.D COMPOST

Municipal and Industrial Composting, involving the use of grinding machines and *The B. D. Compost Starter,* was discussed by Ehrenfried Pfeiffer in the last number of Bio-Dynamics. In the Winter 1949 Number there was a description of the Starter itself.

The possibility of making good use of organic material that now goes to waste is stimulating an increasing and wide-spread interest in the whole process, which is operating successfully in the pilot plant stage. Early this year, Dr. Pfeiffer was asked to visit Texas in connection with this work. Comments in Brownsville, Dallas and Fort Worth papers follow:

"A little cellophane sack of what looks like fine, fresh earth does not look particularly exciting. Certainly it doesn't look like the forerunner of the most unusual agricultural experiment in the Rio Grande Valley or the Middlewest". This is how a Brownsville reporter, Louise Beard Moore, opened her story in The Brownsville Herald of February 12, 1950. She went on to tell of Alexander Debruille, who brought Dr. Pfeiffer to Brownsville, and referred to Dr. Pfeiffer's dairy farm and research laboratory in New York State.

"It's so simple, up to a certain point", the writer commented, "you wonder why somebody hasn't done it on a large scale before. Ingredients for the 'finest possible humus compost', as Dr. Pfeiffer calls it, are waste vegetables, rotten tomatoes, banana stalks, citrus peels, water hyacinths, shrimp heads or what-have-you.

"Plus, and this is the secret part, a little bit of 'bacteria starter' which Dr. Pfeiffer says is the only laboratory-controlled humus forming bacteria mixture in the world. The bacteria starter, about two pounds to the ton of shredded garbage waste, works somewhat like yeast in bread. It disintegrates the waste organic matter, which is put through a mechanical shredding machine, within 48 hours into a fine, damp earth-like powder. Nature would take two years to do this, the chemist said. The bacteria starter mixture contains 14 species of humus forming bacteria. One gram of it (about the size of the ball of the little finger) contains up to 40 billion of the 14 species of bacteria.

"Mr. Debruille, who owns a chemical laboratory for the manufacture of drug products in New York, and has a chemical laboratory on his farm near Brownsville, said tests run after a week showed the new humus compost they have made contains 29 billion bacteria per gram, all beneficial to soil improvement.

"Sounds smelly, shredding rotten tomatoes and other vegetable waste. Oddly enough, action of the bacteria formula kills the odor and there is none around the experimental area at Debruille's resaca bank experiment station on his farm. The mounds of compost smell like fresh, damp earth after a rain, that's all." And after describing local compost production plans, the writer concluded:

"Those mounds of fresh damp earth don't look so exciting, as we said at first. But they might be the biggest agricultural experiment in Texas or the

Middlewest. Debruille honestly believes so. Similar experiments are being made in New York State and Pennsylvania and California, none here. Doctor Pfeiffer who is a naturalized American citizen, and a graduate in chemistry of the University of Basel, says the new compost is the answer to run-down soil and drought. They feel it's worth watching."

The Dallas Morning News of January 25, 1950 had carried a report of Dr. Pfeiffer's lecture the previous evening before an audience of nurserymen, garden club members and members of The Friends of the Land. The writer, Nancy Richey Ranson, led her story off with the comment:

"There would be no malnutrition in this 'land of plenty' if common everyday waste material were used to rebuild down-at-the-heel land. This could be done in record time if cities replaced incinerators with garbage composting plants.

"So said Dr. Ehrenfried Pfeiffer, specialist in agricultural biology, soil conservationist and operator of a 285-acre dairy farm at Chester, N. Y. in a talk here Tuesday evening. . . .

" 'The organic matter in soil and with it humus, nitrogen and colloidal structure, has been declining steadily in our soil until it has dropped from 4 to 5 per cent on virgin land and black fertile soils, to 1.5 per cent,' Dr. Pfeiffer said.

" 'The fertilizer industry is unable to provide all the nitrogen farmers' need. They must use soil conserving crop rotations, cover crops, manure and compost if they are to hold the soil. It must be brought back to a high nourishment value by the return not only of minerals but of organic matter as well.' . . .

"Dr. Pfeiffer has spent nearly twenty-five years working out a system whereby all waste material, including garbage, can be put back, with great profit, into the land. He estimates that a city of 50,000, producing between 100 and 200 tons of waste garbage daily, could turn this waste into 35,000 tons of compost a year—enough to fertilize 7,000 acres. It would be worth as much in rebuilding land as twice the amount of barnyard manure.

"Dr. Pfeiffer came to Dallas to demonstrate to his friends, Mr. and Mrs. J. W. Sarver, his method of turning out quick and effective compost by machine. Various waste materials were fed into the machine in a mixture; peanut hulls, leafmold, barnyard manure, weeds, sawdust, ensilage, soil and bacteria culture. Garbage or organic matter was 50 per cent of the mixture, manure 15 to 20 per cent, other ingredients made up the balance, with two pounds of bacteria culture to a ton of waste. All were ground together."

The Fort Worth Press, of January 23, 1950, concluded its story of Dr. Pfeiffer and the composting process as follows:

"Dr. Pfeiffer shows what he means. In a brief case he carries a plastic sack like a tobacco case, filled with the black mold or humus. 'See it, smell it', the tall sturdy German-born biochemist says.

"The cost? About $12 to $15 a ton after the initial investment in equipment, which he has designed.

"Dr. Pfeiffer talks from experience. In 1944 he purchased a 285-acre farm near Chester, N. Y. The farm was neglected. Today from the farm's earnings he has made improvements, supported his family . . . and paid back $8,000 on his mortgage."

Interest in the whole matter is not lacking in the East. In recent months he was asked to demonstrate and tell of his process at Buffalo and near-by Hamburg, N. Y. City officials were present at the demonstration, and conservation-minded citizens heard Dr. Pfeiffer speak. He was well received by his audiences.

BOOK REVIEWS

By Ehrenfried E. Pfeiffer

MAKE FRIENDS WITH YOUR LAND by Leonard Wickenden. The Devin-Adair Company. New York 1949.

This short very well written account of organiculture makes easy and interesting reading. The chemist Wickenden introduces the purpose of the book with: "I wanted to be quite sure in my own mind that organiculture rested on a solid scientific foundation". He has collected all available data to that end. Even though the book deals with scientific matter the language is kept free from the technical jargon which sometimes makes scientific information so undigestible for the layman, in this case the farmer, the gardener, the lover of the soil.

The failure of poison sprays is illustrated. More and more poisonous sprays are applied to combat an ever increasing number of insect pests and diseases which develop on weaker and weaker plants. The question arises whether the increase in crops and size of foliage, which requires larger amounts of sprays is actually a blessing. For "our experts have now arrived at the point where they are solemnly considering advising the farmer to grow punier plants with lower yields so that it will cost less money to cover with poison the smaller expanse of foliage". The increase of diseases on potatoes and tomatoes in spite or because of sprays is used as the most illustrative example. Dr. M. C. Young of the Ohio Agricultural Experiment Station reports that the control of black root disease is possible with ample use of manure or other organic matter. Considerable evidence is quoted substantiating the beneficial value of the organic treatment of soils.

Antibiotics which are produced by micro-organisms living in organically well treated soils, such as those deriving from Actinomycetes, algae, bacteria and fungi, are natural counter agents for diseased soils and plants. The data reported in this connection justify the value of compost not only in order to fertilize the soil but even more in order to "heal the soil." The sterilization of soil and burning plant wastes are not the answer. This is only a temporary measure because it destroys the antagonists in a living soil too which would otherwise help nature to bring about a cure of the ills of the soil. "To grow healthy seedlings," so the author states on the basis of his own experience, "it is not necessary to sterilize the soil, it is not necessary to use disinfectants; it is only necessary to make conditions in your soil favorable to the growth of the antagonists. That means a soil rich in organic matter . . ."

The burning of leaves and garden rubbish is a particularly wasteful practice. Composting of even diseased plant organs will actually remove the danger of re-infection if well done. In this way the microlife is allowed to take care of the situation.

Wickenden confirms the fact, observed by others including the writer, that insect pests do not multiply on soils well treated with organic matter. His report is encouraging, but he also exercises the caution of the true scientific observer: "Don't expect miracles the first year." It will take time for the soil to recover from sickness.

The problems of minerals and trace elements, of sprays and weed killers are discussed in other chapters. The crucial question which comes up in almost every discussion with farmers to whom one tries to introduce organiculture is: What about yields? In order to make money we need yields. With fertilizers we can produce yields. Wickenden goes deeply into the matter of statistical yield reports which may be deceiving if one reads only the figures, but reveal an interesting truth if the weather of the year in question, and the total acreage planted are taken into consideration too. Many sum totals of yields are not due to increases per acre but to weather fluctuations, to increased total acreages, and to increased efficiency rather than to fertilizer applications.

That the soil and crop improvements brought about by organiculture also result in health improvement becomes evident. The task of extending research in the direction of human health is mentioned as a challenge for science. In the final chapters the problem of cost is analyzed and the making of compost is discussed. "It would be possible to make liberal applications of compost and still keep the cost within the same ranges as those experienced when using chemical fertilizers."

The book is artistically illustrated by E. W. Bartlett and introduced by a foreword by Joseph W. Frazer. The publisher merits commendation for bringing this book in its clean and well prepared form before the general public.

CONSERVATION, PLEASE. The Garden Club of America. New York 1950.

Presented by the Conservation Committee of the Garden Club of America in cooperation with the American Museum of Natural History, *Conservation, Please* is a most unusual and very attractive treatise on conservation. It contains a collection of questions and answers on conservation topics. Arthur H. Carhart has done an excellent job of editing. Garden Club members and groups have proposed 88 questions and ranking authorities in the field have answered them. All sides of conservation are covered, natural resources, education, forestry, insect pests and blights, planning, soil and water conservation, wildlife. This brochure contains in 125 pages the concentrated extract of all that ought to be known. It is progressive and non-partisan, illustrated by presenting different points of view, including the organic concept, and giving space and full credit to all. The Garden Club of America is to be congratulated for having published this unique work. It should be read by everyone who is interested in the welfare and future of the land and its products. It can very well be used as a fundamental handbook for information on many pending questions. This reviewer is of the opinion that it would be invaluable in every high school as reading material for biology and social studies as well as for every layman and responsible citizen who would like to orient himself in the subject. Nice cuts add to its attractiveness.

RELATION OF SOIL CONTENT TO HUMAN LONGEVITY by T. J. Brooks, Assistant Commissioner of Agriculture of Florida and T. J. Brooks, Jr. Chief Physician at the Florida State University. Published by The Department of Agriculture State of Florida. 1949.

SOILS AND FERTILIZERS revised by T. J. Brooks, Assistant Commissioner. Published by Department of Agriculture State of Florida. 1950.

The first of these two volumes contains a discussion of balanced soils, balanced foods and balanced health. It is most welcome to find the interrelationship of soil and health being discussed from the official and authoritative sides in an open-minded way. The brochure gives for those who have little time for reading and searching through a wide literature condensed but very comprehensive information on the mineral and vitamin contents of food, vegetables, the human body and the various points of view and opinions regarding these. Major and trace minerals in their proper biological role are discussed and many progressive authorities are quoted. Whoever wishes to get a picture of the major problems of the relationship of soil to health can find it in these 116 pages.

In the last chapter titled The Compost and Commercial Fertilizer Controversy, we read: "It has only been discovered that human health is closely related to the plant-food elements in the soil from which food is obtained. The only way to get the elements in the food is to have them in the soil. It matters not whether it is brought in a sack or furnished by building in a compost. Neither is infallible. The greatest fault is in the habit of depending on unmineralized compost or using chemically pulverized raw minerals without humus or the decayed vegetation which furnishes the growing materials regardless of the mineral content. The only practical alternative is to rotate crops and grow soil improving crops and produce humus in the soil where extensive farming is practiced." Evidently the author intends to build a bridge between the compost-humus and the fertilizer practices. He doubts that the goal can be reached with either compost or fertilizer alone. It is true that a deficient soil will produce deficient plants which in turn produce deficient animals and human bodies as well as deficient compost. It is, however, not sufficiently recognized that humus in soil has a "holding" capacity for minerals and especially trace minerals, moisture, etc., which enables the soil to produce less deficient plants than soils which are low in humus. Mineral fertilizer also can be deficient. The emphasis on NPK only has caused many deficiency symptoms especially of trace minerals. This fact is now beginning to be recognized. That the "holding" capacity of humus can counteract such deficiencies and establish the necessary balance in soil is not as yet sufficiently recognized.

On the basis of 25 years of working with the bio-dynamic method, the writer can state that the proper bio-dynamic treatment of soils has taken care of both the humus problem in soil as well as the complete mineral contents of crops. As evidence, bio-dynamically grown wheat, so grown for 20 years without commercial mineral fertilizer, ranks at the top in mineral contents. A farm in Holland, under extremely favorable climatic conditions, under the bio-dynamic method for 20 years, without commercial fertilizer, obtained yields of 100 bushels per acre of wheat, 70 bushels of peas per acre, and 450 bushels of potatoes per acre. This is our argument for bio-dynamic or organic treatment of soil and we hope that in due time it may be taken serious-

ly by agricultural authorities. Many experts are still afraid that the use of compost, etc., does not supply the necessary minerals. Our empirical experience shows this fear to be without ground. If and when our soil experts discover the answer to this question and find out why humus holds the minerals and pure mineral fertilizers do not, then a new era will have begun and real progress will be made.

The other brochure, *Soils and Fertilizers*, is also compact, easy to read and understandable; open-mindedly discussing all the problems good and bad related to the use of fertilizers and their effects on soils. The hitherto unsolved problems of the proper understanding of soils are presented, for instance that a soil can be well provided with all minerals according to analysis and still not be fertile; that there is a great difference between tested contents of a fertilizer and availability. The reasons for the failure of high grade, concentrated, fertilizers especially on light soils are openly stated. Organic matter and trace minerals are included in the overall picture of the requirements of soils and crops. We find such important information as that "the mineral content of a given vegetable varied as much as 200 per cent when grown on different soils in different areas. There was little correlation between fertilization or soil analysis and plant composition for a given area of similar soils. The factors that characterized soil types appeared to be organic matter content and pH of the soil. Other factors of soil environment and moderate differences in fertilization were of secondary importance." Organic matter, therefore, is one of the MAIN factors. This reviewer had said so for many years and it is a great satisfaction that others are beginning to discover it too.

The Liebig theory is still held in high esteem by Mr. Brooks. One outcome of Liebig's theory is the law of the minimum, which indicates that the factor in soil which is in the minimum, i.e. neglected, determines plant growth. So far this has been applied mainly to the major minerals, N, P, K, and Ca, but if applied to trace minerals, and humus, it is also valid. Since it is stated now that the humus content is one of the MAIN factors, full attention should be paid to the humus (and pH) problems in soils. In Chapter III on Composting and Mulching, we read: "Through the use of organic matter large amounts of plant food may be made available. When the organic matter is well-rotted and becomes part of the soil it is then a storehouse for plant food. It takes part in the exchange reaction in the soil, that is, it reacts with the mineral plant foods and holds them in a readily available form for the plants." The water holding capacity of organic matter is also mentioned. "It is obvious that one should maintain the organic matter of the soil. Over a period of years the financial return is larger if the organic matter is maintained than if it is allowed to run low."

Composting methods are then discussed, but mainly with such agents as cyanamid, superphosphate, sulphate of ammonia, etc. The organic and biodynamic methods which have proved to produce the very best humus obtainable are by-passed. This is regrettable inasmuch as it begins to dawn that "it is generally recognized that organic matter increases the efficiency of the

fertilizer as well as improves the quality of the soil". This writer is unbiased enough to welcome such a statement because it helps to arouse the interest of the fertilizer group in the use of organic methods and to break away from the belief that the inorganic alone will solve the problem of our soils. From here to full acknowledgment of the very best which can be had in the organic field should be only a short step—which can be taken without "losing face".

AN INTERESTING DEVELOPMENT

An active B.D. worker, who has sent us news items in the past, Miss Josephine Snyder of Stroudsburg, Pa., recently wrote BIO-DYNAMICS again. Her letter follows:

As I was glancing through the *Journal of Proceedings of the National Grange*, 1949 Annual Session, I saw the following, which I thought might be of interest to B. D. members.

Page 164 quote—

"Investigation of Organic Agriculture

The Committee approves Resolution No. 29—Carstensen

Whereas, the practice of organic agriculture as pioneered by Sir Albert Howard, Ehrenfried Pfeiffer and others is gaining thousands of adherents throughout the world; and

Whereas, the proponents of organic agriculture claim to have a practical method of developing natural soil fertility which they declare to be the only basis for maximum health of plants, animals and humans; and

Whereas, it is claimed that the present practices of agriculture, employing commercial fertilizers and poison sprays could be responsible for virus diseases;

Therefore, be it resolved that the National Grange ask investigation of the above claims for organic agriculture by State and Federal agricultural agencies.

Adopted" end quote.

Cordially yours,
JOSEPHINE SNYDER

EXPERIENCES WITH A FARM POND

GEORGE BECHTOLD

Mr. Bechtold, of Waterloo, Ill., is one of those who have responded to the request for practical experiences that might be of interest and possible help to other readers of Bio-Dynamics. Too modestly, the writer had put at the conclusion of his interesting story that he was "no writer, and in the true sense of the word no farmer." He added that "We live in a log shack, no tractor, electricity, and few modern implements. When I speak of 'we', it is my mother, 77, who helps with the hay, gets the eggs, likes to put on the tree paste and help stir the B.D. preparations, and my brothers who come over occasionally. And there are a few neighbors who help."

The author begged that there be no correspondence or visits *as a result of his piece in the magazine, because there simply is not time to do either justice. The story was written "thinking this might help someone to help themselves to avoid the mistakes we have made."*

* * *

In 1940, on the Mississippi bluffs, a dam was built in an unused, wide ditch. It was made 300 feet long, 22 feet high, 100 feet wide at the base and 15 feet at the top. It should have made a 6-acre pond, but sliding on the dry side of the dam—due to insufficient ground cover—and the waves eating away the water side, held it to 4½ acres. This pond is about 1/5 of a mile long.

Now you may get a mental picture of the river flowing in front of our door, but there are about 6 or 8 miles of bottom land before you reach the river.

But although away from the river itself, the pond has its own flood conditions. Last fall a hog-tight fence just west of the pond was laid flat and covered by a wall of mud which came down out of our neighbor's field. As a result, the head of the pond has now filled with about 2 feet of silt. Adding of organic matter to this pond according to plan is done by having the hog pens located near it, and also having the run-off from the horse lot led into the pond instead of the creek.

In 1941 a 7-acre field North of the pond was planted into alfalfa. No earthworms were found in it at that time—they were scarce around the whole place. We dressed the field with 300 pounds of super-phosphate to the acre (that was before we heard of Dr. Pfeiffer). In cutting this alfalfa I always kept the mower as high as it would cut and let the hay lie as long as I dared. Naturally, many leaves and stems were left on the field, but here the fertility of the field and the pond were more important than the hay. This field was never harrowed, and the alfalfa kept getting better until 1948. Then it started getting full of grass and cheat, *but full of earthworms too.* Whether the pond attracted these earthworms I do not know, but I do know that a field across the creek still has few or no earthworms. And field No. 6, on which I received a report from the Biochemical Research Laboratory, also has very few earthworms, and the report stated it was of

medium low fertility, and recommended subsoiling which was done. Field No. 5, bordering the pond on the South was put into oats and sweet clover twice and corn one time in 9 years. In 1949 we dressed it with 1,500 pounds of rock phosphate and subsoiled 4 acres. This field also has many earthworms. We will try and get some of the Bio-Dynamic *manure* on it, if I can secure help.

The pond itself was stocked with a few bass, crappie, catfish and sunfish from nearby ponds. In 1945 it was teeming with fish, cattails, frogs, turtles, water weeds, algae, muskrats and water lilies. The water lily is the big fellow, the lotus or Egyptian water lily, with big round leaves 3 feet across, big yellow blooms 12 inches across and stems 8 and 10 feet long. By 1947, these had taken over about 2 acres. In blooming they are a beautiful sight, full of bees, their pollen baskets full of this orange pollen. In a drought I believe these flowers would save many bees. Also other insects are on the stems, and many water snails. Our neighbors call these Yorkey Nails, and say they are good to eat. I do know the ducks like them.

I have an idea these sturdy, dark green plants aim to choke out other life to benefit themselves. It is also said they purify the water, which is almost always clear.

The cattails line the shore to a depth of 15 to 20 feet, and blackbirds by the hundreds roost in them at night—their droppings must be considerable. I have seen them eat gobs of cattail seed, and muskrats love the tender shoots.

Here you see Nature's law at work. Fish eat fish, baby ducks, geese and, blackbirds and frogs are devoured by turtles, snakes and bass. Turtles trapped or hooked in 1947 were 33, some weighing 12 to 15 pounds. In 1948-49 we got over 60 muskrats. One wonders how these found this pond. Probably some came from the Mississippi. All help organically.

No farm job will get dull as you see one of the great ospreys dive from as much as a hundred feet and come up with a fish clutched in his claws. Or you can look into the water and see fish with green, gold, blue, pink, black, blended in colorful hues.

You might say here, "Let's make a pond." Here are a few mistakes we made which you might improve on or avoid. Most pond layouts give only the sunny side of the picture.

We located the dam where there were fields below, which could be irrigated—this cannot always be done. Next, remember that under the dam site there can be no gravel, with the dam itself heavy clay—this will not work out. And if you put it across a creek, the pond will fill up with earth in a short time.

Don't sow the dam to lespedeza or sweet clover, as these roots go very deep and make a dam porous. Willows, cattails, brush, woodchucks and muskrats must be kept off (some job!).

One mistake made: a picket fence was put up to break the waves. This was down in about 3 years, a refill made and a solid wood fence put up. This was broken to pieces in 1948, another refill was made, and this time

about 105 tons of building stone were put down, making a facing 1 foot thick and 5 feet in height on the upper part of the water side of the dam.

We control the water-level with 2-inch pipes and siphon the water over the dam at the spillway. Each pipe lowers this pond one inch in a 24-hour day. The pipes have a cap at each end and a T with a plug on top to fill with water to make them work. These pipes can have no air when they are supposed to function.

The pond should not have too large a watershed (that which drains into it). This pond drains about 50 acres. A pond, to be the best, should be 7 acres or better in area. We are told that this pond of ours will need cleaning, and if so will yield tons of vegetable matter. But it is a gigantic job. When it is done, these fields near it will then profit from the Bio-Dynamic compost made from the pond muck, as they now do from the mist that hangs above them on chill mornings. As for profit, this pond would never equal its area in crops, but you have the satisfaction of knowing that the soil is not going to the sea. You also have the responsibility of keeping people safe when they go out on the pond. This will cause you many a worry. Give them a life preserver and they let it lie on the bank or the back of the boat.

My brothers from the city supplement the other organic matter in the pond with spoiled grain, animal offal and fish skins which would otherwise go down the Mississippi, putting these with brush on the ice in winter-time and sinking the material.

I should add a few words in conclusion: the spillway was first made 10 feet wide, but it did not take all the large rainfalls. So it was extended to 30 feet, with a screen to hold the larger fish. An emergency spillway was made on the opposite bank, set just a little higher than the first one.

The stones referred to above were placed at an angle, so the waves in striking would not wash the earth away in back of them, as this is a dry wall (no cement).

Finally, we have observed that many people around here made ponds in sink holes, and then in times of heavy rains lost these ponds and their fish with them. These bluffs are sink hole country, and underground streams, when they swell, take the bottom of the sink hole with them.

BOGS, BOTTOM LAND AND "BANKING" IN SOUTHERN NEW JERSEY

CLAUDE N. TERRY

The author, writing about natural soil building processes going on along the Maurice River in South Jersey, touches also on "banking company" laws that are as interesting as they will probably be unfamiliar to most readers. The provision for withdrawing the right of use of lands neglected by their owners through not paying the "banking" assessment, is particularly striking. Valuable peat bogs and relatively neglected organic bottom lands are described in some detail by the writer.

* * *

From Millville, N. J. to the mouth of the Maurice River is thirty miles. Along this river in many places the soil is still in the formation stage. This soil is partly formed from the silt which floats in the water of the river. The silt must contain some organic matter. But more organic matter is made from the sedge and reed which grow after the silt has been deposited for two or three years.

About every mile of the banks of the Maurice River was diked at one time. The dikes were built by hand labor, back when the country was young. They were seven or eight feet high. One wonders how men, just by hand, could built such massive dikes. Now most of them are broken or gone altogether. The water of the river floods over the meadows at almost every high tide. Only about two sections are still diked; one of these is from Mauricetown to Port Norris.

The dikes still keep the water off, but they are badly eroded by tide and wind in several stretches. These few thousand acres are controlled by the Yawk Wak Meadow Company.

New Jersey has special laws covering *Banking Companies.* The laws cover ways to raise funds to build dikes and maintain them. The law provides that where a major part of the owners gather together in a meeting, properly called, they may vote to establish a Banking Company. They vote according to the number of acres owned. All property owners coming within the section benefited by the dikes may be assessed according to the value of their acres to pay the cost of building the dikes.

If an owner fails to pay his assessment, the Banking Company may *sell* the land to another owner for 99 years. This we call a 99 year meadow lease. The same principle applies to raising funds to maintain the banks or dikes. Every year, the by-laws of the Meadow Company call for a meeting of all owners. They elect a board of managers and a treasurer-secretary. They also fix a percentage of property value to be assessed to maintain the dikes.

From Millville to South Port Norris by air-line is only about 10 miles. But the river, following many turns, is 30 miles long. So there is a meadow line on both sides of the river 30 miles in length. A few sections have the upland coming to the river edge. The upland, or main land, runs in a fairly straight line between these two communities, but the meadow line follows

the river. The outside meadows have flooded and silted from the river for about one quarter of a mile in toward the main land. In some places the meadows are one half mile or more from the river. In some places in the river bends the meadows are narrow enough so that all their land has silted. It is on these silted acres that the fine farm land is located.

Between the built-up, silted farm lands and the main shore, are the bogs. In most of these are found the South Jersey Peats. Some of these peats are of the forest type, others are the sedge peats, others are mixed with sphagnum moss peats. The moss once grew in the cedar swamps, but has decayed into peat.

In some of these bogs there are buried very old white cedar logs, which are well preserved. Lumber can be sawed from many of the logs. "Mud-shingles" were made from this lumber in times past. These lasted for more than 100 years on the old houses. Some of the logs are thousands of years old, but all had been trees since the Ice Age. There are five layers of logs buried in these swamps, five separate forests having grown and blown down.

In some places in the bogs there are deposits of vegetation which grew thousands of years ago. Some of these are well preserved, others more decayed. Even the smaller roots still show on some of this old vegetation. Much of the deposited material will make poultry litter, other deposits would make material to use for mulches and for flower and nursery stock packing. Some of the peat bogs are 60 feet down to sand, as tested by an engineer in making borings for a road across the area. I understand that Louis Bromfiled has expressed interest in the trace minerals in these old swamps. Here is real value.

There is wealth buried in these bogs and under these meadows. Carloads of this peat may be mined some day, when someone of vision takes hold. I believe that the new compost bacteria starters should turn these peats into good organic fertilizers. An English carbonization expert has found a way to use charcoal with the peats and make them into good fertilizers. Experts have tried the buried cedar wood and found it makes the best of paper pulp. The other deposits may be mined to make even orchard soil.

Now let us continue this brief survey by moving out to where the silt has made the meadows into farming soils after the dikes around them have broken, letting in the tides from the river. The silt begins to deposit in some meadows faster than in others. Where the silt comes from is a matter for guesswork. There doesn't seem to be enough land eroding into the Maurice River to make all this silt. Perhaps some of it comes down the Delaware River into Delaware Bay and up Maurice River on the flood tide.

After the meadow has been out under water for a year or so, then spatterdock will begin to grow. In another year or so the reed which is called wild oats starts growing. It grows all through the Spring, Summer and Fall, till frost. Birds feed on it in the Fall. Blackbirds will leave corn and feed on these wild oats, then along come the winds and tides and beat the wild oats down. It soon breaks up. A part drifts on shore, where some

farmers gather it. Some of it is buried by the silt. It decays very easily and contributes to the formation of rich, organic soil.

Farm land here, produced through years of this process, has grown 300 bushels of corn per acre, as measured by the U. S. Department of Agriculture. Wheat, potatoes, hay, are all great crops on this organic land. A representative of the U. S. Department of Agriculture told one farmer that all that was needed to grow crops on this virgin meadow land was lime. A commission merchant from New York City announced that if muskmelons could be grown equal to the Rocky Ford from Colorado, a great price could be obtained for them. The merchant supplied some seed, and a farmer here grew the melons. They were all the merchant had asked for.

There are not more than 10 or 12 acres of all the meadow in the Lower Section now farmed. It seems to me to be a crime when the U. S. Government spends so much money to irrigate Western alkali land, and here this organic meadow land is wasted. What if crops from which baby foods are made were grown on this land? No disease, no poison sprays! Why don't we wake up? And we could add even more trace minerals from the old swamps, they are the more abundant in these bogs because at times sea water covered them.

SOIL AND HEALTH

WALTER VANDER BEEK

This bio-dynamic farmer was born in The Netherlands. He encountered the B.D. Method through seeing a Dutch translation of one of Dr. Pfeiffer's books in a store window, tracing down the local B.D. organization and sitting in one of their conferences. Soon he went to work on one of the farms established by Dr. Pfeiffer in The Netherlands, at which he spent a half a year. Then, towards the end of 1947 *he came to the United States and went right to work at the Pfeiffer dairy farm at Chester, N. Y. At the end of* 16 *months during which "I saw, heard and learned much," Mr. Vander Beek went further West, this time in a* 14*-year-old Ford.*

After about a year at the Carnation Milk Farms, Carnation, Wash., he has recently joined with a few other enterprising Dutchmen to start the Hollandale Farm, Rt. 1, *Box* 440, *Auburn, Wash. Starting this season with truck gardening, Mr. Vander Beek and his associates hope to add a big orchard and dairy before long. He writes that "there is an unlimited market for all our products."*

* * * *

When one asks the question, "What is the primary goal of agriculture?" and the answer is "To produce high quality food," nobody will deny that this is a good answer. And this answer confronts us right away with the problem of the inner *quality* of the farm and garden products that are grown.

The layman will expect to find in the literature, journals etc., a lot of advice for the farmer and gardener about ways to grow a *quality product* for the nutrition of man and animal. He will be disappointed! Probably he will not find anything about measures to be taken to produce food that will bring health and resistance to as high a level as possible. The greater part of the available advice consists of *measures to enlarge the output* and *to improve the outer appearance*. The layman would naturally come to the conclusion that there is no relationship between the quality and the way of raising the produce.

An incomplete way of growing food, one which is no longer based on the striving for the above-mentioned goal of *quality*, can cause extensive deterioration in our foodstuffs. This fact, which is becoming generally known and recognized, makes it difficult to understand why the problem is given so little study. One of the reasons for this is the trifling contact between agricultural and medical science.

Liebig, the German chemist, made the mistake a century ago of stating that the fertilizing of the soil would be a pure chemical process instead of a biological one. He maintained that all that the plant needs could be found mainly in the chemical contents of the fields. At the end of his life he renounced this theory, seeing the mistakes it embodied. However, this "chemical viewpoint" replaced the accumulated experiences of many centuries of organic farming, and has shown in its results, during the last 100 years, an ever-increasing amount of diseases of plant, animal and

man. The evidence is accumulating that, with the use of artificial fertilizers, the important elements are lacking in the crops or are not present in a well balanced proportion. And as a result, resistance to disease is diminishing. "Hoard's Dairyman" lists, in its handy "Common Ailments" booklet, 65 diseases just for cattle, 21 for poultry, 22 for swine and 21 for horses.

Sterility in cattle costs the English farmer and Government $30,000,000 yearly. The figure is considerably higher in this country. The diseases in plants are innumerable. Extensive spraying with dangerous poisons is held necessary to keep bugs and fungi down.

Sir Albert Howard, one of the pioneers of organic farming, found that the number of earthworms decreased considerably when artificial fertilizers were used. Earlier, Darwin had already recognized the extreme value of earthworms for the fertility of the soil. He devoted a whole book to their activity. It is figured that, per season, 16,000 pounds per acre of soil goes through the digestive systems of these busy worms, thus providing a humus increase which enables us to grow healthy plants. For every human being, ten times his weight in earthworms is working under the surface of the soil.

Dr. E. E. Pfeiffer, authority on Bio-Dynamic Farming, (a more advanced organic method), made an interesting test. A big wooden box was divided into four equal parts with small openings between them. These were filled with the same soil, treated however in several ways: respectively with artificial fertilizer, liquid manure, bio-dynamic preparations, and one without treatment. An equal number of earthworms was put in each section. After 4 days the increase in worms in the bio-dynamic section was 120%, and the other 3 parts had a population decrease in percentages ranging from 20 to 80.

Interesting too was Pfeiffer's "root-choice test." The roots of one chrysanthemum, placed in a somewhat similar box, had an equal choice of the soil they preferred. The bio-dynamically treated section had the most roots. These tests are not made in tubes, but Nature gets a chance to show her preference.

Cows have a very good sense of taste. They will prefer the grass from composted fields instead of the chemically fertilized fields—also, they prefer untreated fields to freshly manured fields.

Holland is a typical example of what has happened to agriculture in recent times. The old farmers know that foot-and-mouth disease was an insignificant ailment when they used sod-compost and manure on their fields. The introduction of artificial fertilizers made this disease one of the worst, next to tuberculosis. Hundreds of farmers keep their cattle free of tuberculosis by giving an extra amount of beets, carrots, etc., in the daily ration, or even using products such as yeast and cranberries. A survey conducted in Holland with regard to the farms where foot-and-mouth disease is found and where not, revealed the fact that on highly *efficient* farms with a very one-sided plant growth in the pastures and the use of large amounts of artificial fertilizers, the cattle were far more apt to catch the disease than on the farms where the cows were able to eat some weeds such as

dandelion, yarrow, plantain, stinging nettle, and buckwheat and several clovers, and could nibble leaves from an oak, birch or hazelnut. Such free choice feeds aid the digestion and give the animals resistance.

It is generally known that too high a potash content in animal food can cause heart trouble in cattle. Let us look at human health in its relation to the soil and soil fertilizing. Science has multiplied its activities, but so have illnesses. There is an enormous increase in degenerative diseases which affect heart, kidneys, teeth, arteries and nerves. Tests have shown repeatedly that our truck garden vegetables contain a high amount of potassium. When cattle are affected by a surplus of potassium, why would not human beings also develop illness?

It is known that countries such as Egypt and the North African colonies hardly know what cancer is. And it is an interesting fact that grass which is heavily fertilized with nitrogen has a very low magnesium content. The same is also true for our human food. The easily soluble nitrogen in chemical fertilizers will favor a quicker growth. It means however that the plants are then not able to keep up the corresponding intake of other minerals—as revealed by samples of plant ash in tests. Therefore they become weak, and lacking in resistance against diseases and pests. And when we come to eat these plants with their unbalanced mineral content, it puts a heavier load on our kidneys to get rid of the surplus. A high-protein diet leaves many decaying products in our digestive system, and a lack of magnesium slows down the formation of the transmutation-ferments and in this way aids a predisposition to many diseases.

Let us take a few newspaper items:

"Prosperity wrecks Eskimo teeth" (Middletown, N. Y., News-Herald, Nov. 12, 1948). A dentist was sent to the Northernmost tip of Alaska by the Federal Government for a dental survey in connection with the Naval Arctic Research Laboratory. He examined about 600 Eskimos and found their teeth in "terrible shape." Eskimos draw $300-600 a month as laborers, and use the money to trade their former diet of seal, fish and walrus for the menus of Americans.

"Nation's Draft Rejections at 72%" (The New York Times, October 31, 1948). Selective Service officials in the nation's ten largest cities reported that an average of 72% of the 24-and 25-year-olds called up for preinduction physical examinations were unfit for military service. Psychoneurotic disorders and heart ailments were the major causes of rejection.

There is an incontestable relation between the fertility of the soil, its biological balance and the health of plant, animal and man. Enormous amounts of money are consumed by absences due to illnesses, and by their treatment. Through improved hygiene, the death rate among children, and the mortality due to infectious diseases, have been diminished and some years have been added to the average age of mankind. However, the disease figures rise alarmingly. There is little resistance against infectious and degenerative ailments. It should be realized that *treatment of the diseases* can

never stop them as long as *the basis of health* is wrong: our food and the way of growing it.

Prevention, however, is better than cure. Among the peoples of the earth there are several groups that enjoy a perfect state of health. The agriculture of the Hunzas of India, well-known as an example in this connection, is a closed system. They use no artificial fertilizers, only compost, and apparently their lives are perfectly healthy. The white population of Prince Edward Island in the Gulf of the St. Lawrence is a community of exceptional health. Compost-grown food, and products of the sea form their menu. Several boarding schools in England grow their own food organically, and report that there are no plant diseases and that the children have perfect health.

From New Zealand comes the story of the Mount Albert Grammar School in Auckland. Their health examinations showed 5% of the children with enlarged glands, 15% goiter, 15% enlarged tonsils, 32% with dental caries and 66% with other physical disorders. The school is one that raises its own food, and after turning over to organic farming there was a report of improving health. After 12 months there were less respiratory ailments, less constipation, less jaundice, and less cavities in the teeth. The growth of the children also improved considerably.

The inhabitants of the Faroe Islands, Iceland and Greenland live in a cold climate. They got their food from the sea, and all had wonderful teeth before white flour, sugar and canned foods were imported. The population of Tristan da Cunha in the southern part of the Atlantic enjoys good health, and lives on fish, potatoes, cabbage, some other vegetables, milk, butter, birds' eggs and some meat. The agriculture there is purely organic. Some North American Indian tribes were examples of good health, and deteriorated visibly after their food was imported.

Is it necessary that still more diseases of plant, animal and man have to invade our civilization before we see that our world is on a side track?

The way in which many people, in both city and country, live, invites declining health. In the morning a cup of coffee, white bread, prepared cereal, some rolls, etc. At noon a run to the drugstore, a bottle of pop, a hot dog, a hamburger, some ice cream, that's all.

Mama is working too, has no time to fix a supper. Well, she opens some tin cans, warms the contents, puts out a salad, ketsup, doughnuts, etc. After supper, in a hurry to the movies. When there is no baby sitter, the children come along too. Before going to bed, papa takes his vitamin pills and mama her sleeping pills, (be careful mama, no overdose) and the children get a slice of enriched, vitaminized, bleached white bread. Mama awakes with a headache and takes her daily aspirin tablet.

Not only in the city but among rural people we find the same attitude. Many farmers don't even grow their own vegetables and potatoes. Every bit of what they eat is bought in the store. But what are the ways to get out of the labyrinth?

The principal task is one of educating people and showing them in practice the better way and its results. We are the bearers of the responsibility

for the fertility of the soil. With all our machines, we cannot change the biological processes in the earth. These processes are not restricted to our own farm or garden, but are connected with the whole universe, for instance with the rotation of the earth and the changing of the seasons.

The declination of the sun, altitude and latitude.
The main winds.
Influence of the Gulf Stream and similar ocean currents.
The landscape and its variations such as mountains, lakes and plains.
The kind of soil — clay, loam and sand.

Finally we come to our own place whether big or small, whether we are tenant or owner. We have to take care of it, preserve it for our posterity. In this respect we are not owner, but steward of God, the Creator of all.

Mainly by misuse and exhaustion of the soil through extensive monocultures, deforestation of the hills and the repeated planting, without proper rotations, of humus-robbing crops such as corn, cotton, tobacco and grains, do we bring about a denudation of the earth.

The Soil Conservation Service in our country endeavors to maintain the productivity of the soil. However, 61% of our arable land is now lost by erosion.

Societies and movements such as the Friends of the Land, with Louis Bromfield, the Catholic Rural Life Movement, Organic Gardening and Farming, under J. I. Rodale of Emmaus, Pa., author of *Pay Dirt,* the Bio-Dynamic Farming and Gardening Assn., Inc., under the eminent leadership of Dr. E. E. Pfeiffer, author of "The Earth's Face and Human Destiny" (Rodale Press, Emmaus, Pa., $2.75), and others, promote the knowledge that the balance in Nature can only exist where there is a harmonious landscape and where a sufficient humus content in the soil enables the producer to grow healthy plants. Such balance is found in every natural landscape before man has changed it, whether this is the jungles of the Amazon River, the prairies of our Mid-West or the tundras of Russia.

The diversified farm can fit into a healthy landscape. With dairy and field crops, or dairy plus truck garden, it can form a biological unit in which the soil is supplied and kept alive, from organic sources, for the benefit of both the farmer and the consumer. Many farms and gardens throughout the U. S. A. already form the basis of a real health program. For instance, a particular city group could use one of these already existing places for a consumers' cooperative farm on an organic basis. That this is possible was proven in Holland. The bio-dynamic farms of Dr. Pfeiffer on the island of Walcheren and in Brabant supplied a large group of steady customers. The products could compete in price with those of other producers because cattle diseases and their costly treatment, and resultant losses in milk, were eliminated, spraying of expensive poisons was not necessary, and the elaborate steaming or fumigating of hot house soil could be omitted. All this is aside from the consumers' appreciation of the health-improving value of the high quality and fine taste of the products of those farms.

It is clear that we must go beyond questions of methods of growing food. Parasitic, infectious and degenerative diseases in plant, animal and man must be considered as a warning. They show that the soil fertility is diminishing and the balance in the soil is disturbed. Treatment of diseases by drugs and poisons can never cure the conditions, but only drive out the symptoms. It is a matter of getting at the basic cause. The problem of food and its influence on health is many-sided. We can do something about it in our own garden, and if we don't have that opportunity we can still provide our family with produce purchased from an organic farm. There is no doubt that such steps will lead to improved health and a happier family life.

Advertisements

FOR SALE:

FARM in CANADA

170 acres, 57 miles from Toronto, bio-dynamic method, beautiful home with modern conveniences. Price $17,000 not including cattle and machinery. Ill health reason for selling.

OTTO FRIEND

TYRONE, ONT.

Aged couple have 40 acres, 23 in cultivation—equipped with tools, truck, house and greenhouse—some stock.

Want to correspond with couple as to management of same, using organic methods.

Must be able to finance setup and furnish own assistance.

P. S. WEBBER

Rt. 2 - Box 407 - Bessemer, Ala.